

## INTRODUCTION AND MOTIVATION

The Stock Market, also known as the Financial Market, is the economic pool of investors, brokerage firms, and powerful corporations where public shares are available for trade. The basic underlying principle is buying stocks at a low price and selling them at a high price to gain profits. Stock trading is inherently risky, owing to unpredictable stock price fluctuations. Consequently, an investor stands the chance of incurring great losses if proper trading strategies are not employed. How then, can an investor wisely distribute their money in specific stocks/companies in a way that maximises their profits, minimises the risks, and corresponds to their desires?

Various Algorithms and Machine Learning Models are being implemented in this era of digital transformation to make trading simpler, less complex, and less risky. For instance, the High-Frequency Trading (HFT) algorithm that is used by large investment banks and hedge funds, is able to analyse the market's trends in a fraction of a second and execute millions of traders' orders at high speeds. Such jawbreaking algorithmic platforms tend to be out of reach for common or starting traders or investors, mostly due to the price factors involved. Online brokers also readily offer advisory services at a cost this often uncomfortable to most starting traders and investors.

Trading is multifaceted and needs consideration of variables such as time, price, volume, among other technical indicators, factors that may be difficult for traders to fully comprehend and monitor. These variables can be curatively programmed in algorithmic trading to achieve the best profit in each trading activity with little to no error. This is the focus of this project; curating an algorithmic platform that handles the backend analysis, and providing the trader with the most lucrative stocks at a given moment.

## PROBLEM STATEMENT

We seek to create a platform that gives traders a competitive edge in the stock market industry. We aim to help them make better-informed trading decisions and achieve portfolio diversification within one month of using our platform, thereby increasing their trading profits by at least 5%.

## PROJECT OBJECTIVES

1. Cut down the cost investors incur to build optimised portfolios by at least \$5 per trade within one month.  
For a user who doesn't have much knowledge of stock analysis, the use of online brokers becomes necessary. A broker will charge a commission every time you trade stock, either through buying or selling. Trading fees range from the low end of \$2 per trade but can be as high as \$20. Depending on how often you trade, these fees can add up and affect your profitability. We aim to reduce this expense for the user. (Langager, 2022)
2. Cut down the time new investors take to build optimised portfolios to within 1 hour.  
New investors typically spend 6-12 months to gain enough knowledge and confidence to invest. We aim to build a platform that does the analysis and prediction for investors, enabling even a novice investor to find the most optimal stock combinations at the click of a button. (FreedomTrader, 2015)
3. Increase investor' profits by at least 5% within 1 month of use of the platform
4. Improve accuracy of profit predictions by 5% within 2 weeks of running the platform
5. Enable users to create a minimum risk portfolio (within 2 weeks) without short-selling, thereby reducing risks by 5% as compared to portfolios that allow short-selling. (Frankel, 2016).

## PROJECT SCOPE

### Deliverables

1. **Stock Profit Optimization** - Calculate the range of stocks to invest in, in order to get the maximum returns.
2. **Portfolio Optimization** - Identifying the assets that would have a maximised return on investments while minimising the risks associated with the assets.
3. **Stock Prediction** - predict the company stock performance in the future traded in the stock exchange e.g Nairobi Stock Exchange and New York Securities Exchange.

### Limitations

1. Some companies may not be listed in a particular securities exchange
2. Different companies may have different symbols(tickers) for the various stock Exchange markets they may be on.
3. The program can only be used to access a stock market that has an API to access the stock market information.
4. The information generated will not be 100% accurate and this is due to other factors(e.g. social and political) that affect the stock market which are not easy to predict or represent in numerical value.
5. We do not have any authority to discuss any financial matters, the project is solely based on theory learnt, research and assumptions made. Hence the information may not be 100% accurate.

### Impact/Domain

1. Investors who want to invest in stock trading and want a predictable system that would provide a near accurate return on investment estimation
2. Novice investors who want partake in stock trading but don't knowledge
3. Increase efficiency, accuracy and costs involved in stock trading

### Technology

1. API's - yfinance library, that has various methods/API's/libraries to access historical and real time data of financial markets shown on Yahoo Finance.
2. Firefly and Knapsack algorithm that would help in the process of optimising the stock profit.
3. Machine learning to forecast how the stock market will perform in the future.
4. Tkinter python module that would be used to create the Graphical User Interface

## REFERENCES

- Frankel, M. (2016). What Does Shorting a Stock Mean? [online] The Motley Fool. Available at: <https://www.fool.com/investing/how-to-invest/stocks/shorting-a-stock-meaning/> [Accessed 11 Mar. 2022].
- FreedomTrader (2015).How Much Time Will It Take to Learn to Trade and Invest?[online]The Freedom Trader. Available at: <https://www.thefreedomtrader.com/how-much-time-will-it-take-to-learn-to-trade-and-invest/#:~:text=In%20Summary> [Accessed 10 Mar. 2022]
- Langager, C. (2022). A Beginner's Guide to Stock Investing. [online] Investopedia. Available at: <https://www.investopedia.com/articles/basics/06/invest1000.asp> [Accessed 11 Mar. 2022].